

FINAL REPORT
ACCEPTANCE TEST
AND
DESIGN ANALYSIS

PHASE II
ITEM 4

Contract No: NAS5-12455

Aeroflex Job Order No: 60077

Aeroflex P/N: TVF-65-1H

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The Acceptance Test Procedure described in report submitted November 11, 1966 was modified in one respect due to limitations of the test drive motor. Paragraph II of the Acceptance Test Procedure called for driving the motor at 4200 RPM with varying field excitation. Losses at high field excitation were enough to burn out a test drive motor, therefore, losses were measured at 2950 RPM.

The winding information supplied in the initial design analysis was modified when the unit was built. Advantage was taken of winding techniques that allowed a high copper slot fill and which allowed a larger O.D. on the field coil.

The original design called out 133 turns of No. 26 wire on each armature coil. The motors that were built contained 150 turns of No. 26 wire per coil.

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The finished field coils were wound with 3200 turns of No. 27 wire, instead of 2710 turns of No. 28. The field winding was originally designed with four .01 air gaps. Mr. Philip Studer suggested a design change of attaching the field core to the pole plates and rotating the field core within the field coil. This reduced the air gap length to one-half of the designed value, and also reduced required field coil power by one-half. Data from the curves illustrates the saturation that occurs at about one-half of the originally specified voltage.

Comparison of the original design analysis with measured data shows good correlation between measured and design values, taking into account that the original design field currents are reduced one-half.

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The saturation effects that appeared on the test data were not anticipated. The original design contained a reasonable margin for saturation. A probable explanation is the quality of the tape wound cores used for these machines. There were serious delays in obtaining cores from the vendor, with two lots rejected. The material that was finally accepted was improperly bonded and caused considerable difficulty in machining. The extra handling and rework involved would tend to reduce the permeability in the iron.